REMARKS

Reconsideration of the present application is respectfully requested.

A. Status of the Claims

Claims 1-13 are presented for continued prosecution. Claim amendments have not been made at this time.

B. The Office Action

The Examiner maintained the prior art rejections, namely, 1) claims 8-13 are anticipated by Kergen (U.S. 5,477,723); 2) claims 1-4 and 7 are unpatentable over Anderson (U.S. 4,316,379) in view of Kergen; and 3) claims 5 and 6 are unpatentable over Anderson in view of Kergen and Cao (U.S. 6,769,280).

In the prior response submitted on September 26, 2007, Applicants argued that the regulation logic in col. 5, lines 6-7 of Kergen cited by the Examiner is not the predetermined thickness trend (and/or a trend or critical value derived therefrom) of claim 1, the stored downholder opening trend s_o (and/or a critical value derived therefrom) of claims 8 and 13, or the stored downholder opening speed trend v_o (and/or a critical value derived therefrom) of claim 8. The Examiner did not refer to the regulation logic of Kergen in the current Office Action. Thus, it is presumed that Applicants' prior arguments demonstrated that the regulation logic of Kergen does not anticipate or render the claimed invention obvious.

In the "Response to Arguments" section of the current Office Action, the Examiner newly referred to the "blank-holding force profile" in col. 5, lines 9-15 of Kergen to teach the claimed predetermined thickness trend, the stored downholder opening trend s_o, and the stored downholder opening speed trend v_o. It was stated in the Office Action that blank holding force profile is a predetermined and preprogrammed trend which controls the downholder force and prevents patentability of the claimed invention. Applicants respectfully disagree.

1. The blank-holding force profile of Kergen is not the predetermined thickness trend of claim 1

Claim 1 recites that the downholder is controlled such that the initial downholder force is relatively small and further control of the downholder occurs based on a predetermined thickness trend of the edge of the blank and/or a trend or critical value derived therefrom.

As specified in claim 1, the trend is based on the thickness of the edge of the blank. Beginning in the final line on page 2 of the application, it is explained that the thickness of the blank edge gradually increases during deep drawing, because the diameter of the blank gradually decreases and the material in the blank edge must be accommodated on an increasingly smaller surface. Recognition and consideration of this gradual increase in the blank edge thickness provides advantages over prior art methods for controlling the downholder. In such prior art methods which disregard this gradual thickness increase, it is concluded that every thickness increase indicates the beginning of wrinkle formation, and the downholder is therefore prematurely controlled with an unnecessarily high downholder force (see page 3, lines 1-7 of the application). To overcome this drawback of the art, the predetermined thickness trend of claim 1 takes into consideration the above-mentioned increase in the thickness of the blank edge, caused when the diameter of the blank gradually decreases and the material in the blank edge must be accommodated on an increasingly smaller surface.

The Examiner cited the blank-holding force profile in col. 5, lines 9-15 of Kergen to teach the predetermined thickness trend of claim 1. Applicants respectfully submit that the blank-holding force profile of Kergen is unrelated to the blank edge thickness, and is therefore not the thickness trend of claim 1.

In the cited section of Kergen, it is explained that the blank-holding force profile comprises two methods; method 1) being a cyclic variation having an evolving mean value; or method 2) being regulation based on the formation of crinkles measured using either a displacement sensor or an optical system.

Method 2 described above which employs displacement sensors or an optical system to visually discover the amplitude of crinkles is referring to the regulation logic of Kergen that was cited by the Examiner in the prior Office Actions. For recollection, as described in lines 1-7 of Kergen, the regulation logic is obtained by measuring the distance between the die and the blank-holder using a displacement sensor. The displacement sensor (or the optical system which accomplishes the same purpose) described in method 2 of Kergen is the same displacement sensor that is employed to obtain the regulation logic of Kergen previously relied upon by the Examiner and distinguished by Applicants in their prior submissions. Thus, the blank-holding force profile employing method 2 is not the claimed predetermined thickness trend for the reasons previously submitted to the Examiner.

With regard to the cyclic variation of method 1, Figure 3 and col. 3, lines 45-53 of Kergen provide more detail about the blank-holding force profile. Curve A of Figure 3 represents a typical variation in the punch force when the blank-holding force is maintained constant. Kergen teaches that to operate the punch with constant force represented by line E, fluid pressure is adjusted such that "blank-holding force profile" represented by curve B corresponds to an inverted curve A. Kergen therefore teaches a relationship between the punch force and the blank-holding force. Thus, in contrast to claim 1, the blank-holding force profile of Kergen is not related to the thickness of the edge of the blank. Rather, it is related to the force of the punch. It is therefore submitted that claim 1 is patentable over the combination of Anderson and Kergen, which do not teach downholder control based on a thickness trend of the blank edge.

In addition, claim 1 recites that the initial downholder force is relatively small. In contrast, Figure 3 of Kergen shows that the downholder force of curve B initially begins at a relatively high value. The initially high downholder force of Kergen is a drawback of the prior art that has been overcome by the present invention. As described in paragraph 1 on page 3 of the application, increasing the downholder force from a relatively low value as recited in claim 1 allows the apparatus to operate at relatively low forces with relatively little energy and thus be of relatively light design. Moreover, at such low forces the risk of cracks in the blank will be minimal, and less stringent requirements can be imposed on the starting material. Kergen does not teach the relatively small force of claim 1, in fact Kergen teaches the opposite of claim 1, and it is respectfully submitted that claim 1 is patentable over the combination of Anderson and Kergen.

Still further, Kergen teaches that the distance between the die and the blank-holder (i.e. the thickness of the blank) increases as soon as crinkles appear (see col. 5, lines 3-5). This teaches away from the present invention. As explained above with reference to page 3, lines 1-7 of the application, the thickness of the blank edge gradually increases during deep drawing, and recognition and consideration of this gradual increase in the blank edge thickness provides advantages over prior art methods for controlling the downholder. Kergen does not recognize this thickness increase, since Kergen simply associates all thickness increases with crinkle formation. Thus, the predetermined thickness trend of claim 1 controls the downholder is a manner that is superior to that taught by Kergen.

Applicants therefore respectfully submit that claim 1 is patentable over the combination of Anderson and Kergen.

2. The blank-holding force profile of Kergen is not the stored downholder opening trend s_o of claims 8 and 13 or the stored downholder opening speed trend v_o of claim 8

Claim 8 recites that the downholder is controlled based on a stored downholder opening trend s_o, downholder opening speed trend v_o and/or a critical value derived therefrom. Claim 11 recites that the downholder is controlled based on a stored downholder opening trend s_o and/or a critical value derived therefrom.

As illustrated in Figure 1 of the application, downholder opening trend s_o indicates the distance between downholder 8 and die ring 10 (see lines 22-24 on page 4 of the application). The downholder opening speed trend v_o indicates the speed at which the opening changes (see lines 14-21 of the application).

The downholder opening trend s_o can be determined as shown in Figure 3 of the application (see the final paragraph on page 9 of the application). The downholder opening s_o initially has a substantially constant value (range I-II), then gradually increases (range II-III). Beyond point III, the trend increases more rapidly which indicates wrinkle formation P. Thus, the downholder can be operated in range I-III, which is safely before point P where wrinkles begin to form. In a comparable manner, downholder opening speed trend v_o can be similarly measured (see lines 20-25 on page 10 of the application).

Kergen teaches that any increase in the distance between the die and the blank-holder indicates the formation of crinkles (see col. 5, lines 3-5). Thus, following the teachings of Kergen, one would conclude that crinkles begin to form at point II in Figure 3 of the present application. However, as explained above, crinkles do not begin to form until point P. Thus, if the teachings of Kergen were followed which disregard the increase in the thickness of the blank in range II-III, the downholder would force would be unnecessarily increased at point II. This is one of the drawbacks of the prior art which the invention has overcome (see the final paragraph on page 2 of the application).

Kergen therefore does not teach or suggest controlling the downholder based on the stored downholder opening trend s_0 or the downholder opening speed trend v_0 of claims 8 and 13. It is therefore respectfully submitted that claims 8 and 13 are not anticipated by Kergen.

C. Claims 5 and 6

Claims 5 and 6 had been rejected based on the combination of Anderson, Kergen and Cao.

Claims 5 and 6 ultimately depend upon claim 1, and therefore include the limitations of claim 1. Applicants therefore respectfully submit that claims 5 and 6 are patentable over the combination of Anderson, Kergen and Cao and the knowledge of those in the art.

D. Fees

This Response is being filed within the shortened statutory period for reply. No fee is believed to be due. If, on the other hand, it is determined that fees are due or any overpayment has been made, the Assistant Commissioner is hereby authorized to debit or credit such sum to Deposit Account No. 02-2275. Pursuant to 37 C.F.R. 1.136(a)(3), please treat this and any concurrent or future reply in this application that requires a petition for an extension of time for its timely submission as incorporating a petition for extension of time for the appropriate length of time. The fee associated therewith is to be charged to Deposit Account No. 02-2275.

E. Conclusion

In view of the arguments presented, it is respectfully submitted that each and every one of the matters raised by the Examiner has been addressed by the present amendment and that the present application is now in condition for allowance.

An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

LUCAS & MERCANTI, LLP

By: _____
Timothy D. Meade
Registration No. 55,449

LUCAS & MERCANTI, LLP
475 Park Avenue South, 15th Floor
New York, NY 10016
Phone: 212-661-8000
Fax: 212-661-8002

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LUCAS & MERCANTI, LLP

By: _____
Timothy D. Meade